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EPA Region 5 Records Ctr.



237097

CERCLA

Site Inspection

Prioritization

Report



**Illinois Environmental
Protection Agency**

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- A 4 mile radius map & 15 mile surface water map
- B Area Wetland Map
- C Target Compound List & Data Qualifiers
- D 1989 Site Inspection Analytical Results & Sample Location Map

VOLUME 2

- E Analytical Results (under a separate cover)

1. SITE BACKGROUND

1.1 INTRODUCTION

On September 30, 1994 the Illinois Environmental Protection Agency's (IEPA) CERCLA Site Assessment Program was tasked by the U.S. Environmental Protection Agency (USEPA) to conduct a Site Inspection Prioritization (SIP) of the Celotex Corporate Dump Site.

This investigation was undertaken by the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 40 CFR, 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986.

The Celotex Dump Site located in Wilmington, Illinois was initially placed on the Comprehensive Environmental Response Compensation and Liability Inventory System (CERCLIS) in response to the State of Illinois concerns that past site activities may have caused soil and sediment contamination of the surrounding community, on-site wetlands and the Kankakee River.

In May of 1995 the Illinois EPA's CERCLA Site Assessment Unit prepared a Site Inspection Prioritization Work Plan for the Celotex Corporate Dump Site which was submitted to the Region 5 Offices of USEPA for review. A site safety plan was also prepared at this time and after being reviewed by the Illinois EPA's Office of Chemical Safety, the field activity portion of the inspection occurred on June 15, 1995. The CERCLA Inspection included the collection of 10 sediment samples, four of which were analyzed for dioxins.

1.2 SITE DESCRIPTION

The Site is located just east of the Kankakee River on Kankakee Street in Wilmington, Illinois. Celotex operated a solid waste disposal site on a 40 acre parcel of land located at the Northwest 1/4 of the Northwest 1/4 of Section 25, Township 33 North, Range 2 East, in Will County. This disposal area consists of two landfills, two surface depressions, and several unlined disposal lagoons. The landfills appear to be inactive, partially covered and vegetated. The lagoons contain three to four feet of clear water and lack emergent and surficial animal and plant life. This entire area is prone to flooding from the Kankakee River on the west and from the Forked Creek to the south. The perimeter of the site has three distinct wetland areas, one to the northeast, one to the south, and one to the southwest. The site is bordered on the northeast and east by residential areas. These residential areas provide several points of access to the site. Man made paths and trails are easily found throughout this area, showing some possible recreational uses of the site. (See Figure 1, Site Location Map and Figure 2, Site Topographic Map.)

1.3 SITE HISTORY

Celotex operated a manufacturing facility on the southern side of Forked Creek from 1955 till the mid-1980's. According to Illinois EPA files the primary products from this operation were roofing shingles and felt paper. Wastes generated from this plant were then disposed of on the above mentioned property and included: off-specification roofing shingles, felt paper, wooden pallets and

liquid sludge from a recycling mill. This liquid sludge is a by-product from the recycling of rags, magazines, wood pulp, and paper.

In 1979 a site visit by Illinois EPA Personnel revealed a load of waste oil staged next to a surface depression and an oil stained area that possibly had wastes deposited there before. In this same year a 30,000 gallon spill of asphalt material at the plant was cleaned up and disposed of at this dump site.

An enforcement case was started in 1978 against Celotex based on a history of compliance violations. This complaint alleged that the waste disposal site used by Celotex (the corporate dump site) was not operated within the current regulations applicable to it. These charges were later dismissed because the Attorney General failed to comply with discovery orders and due to inadequate documentation.

1.4 REGULATORY STATUS

Regulatory involvement at this site is limited to the above mentioned activities by the Illinois EPA and the Attorney General's Office. The Celotex Corporation Dump Site was never regulated under the Resource Conservation Recovery Act (RCRA), and given the nature of the operation, the years it produced roofing materials, and the federal and state environmental regulations which existed during this time, the site in all likelihood would not fall under the jurisdiction of the Atomic Energy Act (AEA), Toxic Substances

Control Act (TSCA), Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), or the Uranium Mill Tailings Radiation Control Act (UMTRCA).

2 SIP ACTIVITIES

This section contains information gathered during the preparation of the formal CERCLA Inspection and previous IEPA activities involving this site. These activities included the reviewing of Illinois EPA records, preparation of the work plan and interviews with a representative from the Celotex Corporation.

2.1 RECONNAISSANCE ACTIVITIES

In June of 1995, Mr. Mark Wagner met with Mr. Lecil Colburn a representative for the Celotex Corporation and conducted a pre-sampling reconnaissance inspection. This event was conducted to identify the sampling locations and familiarize the sampling team with the site. At this time several locations were found with exposed shingles and associated materials and it was also noticed that the perimeter fence was in poor condition and absent in numerous places. Current site conditions included, heavy vegetation in non-disposal areas, and low water levels in the wetland areas and in the Kankakee River.

2.2 INTERVIEWS

As mentioned earlier Celotex's Environmental Director met with the author just prior to the inspection. At this time CERCLA program

objectives were discussed. Mr. Colburn was familiar with the CERCLA process and exercised Celotex's option to split samples with the IEPA. The dioxin issue was also discussed and he maintained that their operations in Wilmington should not have dioxins associated with them.

2.3 SAMPLING ACTIVITIES

The CERCLA Site Inspection Prioritization field sampling activities took place on June 15, 1995. A total of 10 sediment samples were collected during the SIP from the Forked Creek, Kan~~o~~kee River, on-site surface impoundment, and on-site wetland areas. Samples were collected using stainless steel trowels and augers. All sampling was performed in accordance with IEPA sampling methods and procedures. The sediment samples were taken to determine if contaminants were present at the facility and if they had migrated from the property. Figure 3 identifies the sample locations from the May 1995 SIP. Sample descriptions are summarized in Table 1.

2.4 SAMPLING RESULTS

All samples were analyzed for TCL parameters. In addition, four of the samples were analyzed for dioxins and furans. Several semivolatile organic and inorganic substances were detected at numerous sample locations. One of these sample locations had dioxin levels three times the background concentrations.

Significantly elevated levels of copper were found at six sample

locations throughout the site, the wetland areas and in the Kankakee River. Five of these six sample locations exceeded the Lowest Effect Level established by the Ontario Standards for Copper. Three of the six sample locations also exceeded the Lowest Effect Level for Manganese. Key samples with levels and contaminants are presented in Table 2. The complete analytical data package for Celotex is located in Appendix E and contains a copy of the Target Compound List (TCL) and data qualifiers used by USEPA.

3 SITE SOURCES

3.1 SOURCE DEFINITION

Two sources can be identified at Celotex, they are a landfill and a surface impoundment.

The landfill was identified in aerial photographs and in a 1989, Screening Site Inspection Report. This area is approximately 22 acres in size and was not an engineered disposal area. This area was utilized after a smaller landfill located to the south was filled to capacity. Runoff from this area collects in two wetlands that each empty into the Kankakee River. Inorganics, mainly copper have been detected along both of these surface water paths. In Figure 3. it is referred to as the recent landfill.

As mentioned earlier the smaller landfill was the original area used for disposal by Celotex. Leachate sampled from it did not reveal the elevated levels found in the larger landfill. This area

is prone to flooding from the Forked Creek. Several feet of various materials now cover this smaller landfill.

The surface impoundment is also visible in the aerial photographs. It is approximately one acre in size and is located at the north western edge of the above mentioned landfill. It appears that this impoundment originated as a low-lying area and was used to dispose of asphalt and other unknown materials. Dioxins and furans were detected in a sediment sample from this impoundment.

4 MIGRATION PATHWAYS

4.1 SURFACE WATER PATHWAY

The surface pathway starts where surface water run-off from the site enters the first perennial water body. This location is referred to as the probable point of entry (PPE). Celotex has two probable points of entry due to the location of the on-site wetlands. The points where surface water runoff enters these wetlands are the probable point of entry for the site.

These wetlands are contiguous to the Kankakee River, which is a fishery. The 15 mile Target Distance Limit for this water body is a 15 mile stretch that terminates downstream on the Illinois River near Goose Lake. As mentioned earlier several sediment samples had copper levels significantly higher than the Ontario Sediment Guidelines for Lowest Effects.

The wetlands associated with the site are listed by the Illinois Department of Conservation and the United States Department of the Interior. They are classified as a palustrine, forested, broad-leaved deciduous, temporarily and seasonally flooded environments.

The river is also a source of drinking water for the City of Wilmington. The surface water intakes are upstream of the PPE and do not appear to be affected by the site. (See Appendix B, Area Wetland Map.)

4.2 SOIL EXPOSURE PATHWAY

This pathway evaluates surficial contamination and the likelihood that people and sensitive environments will be exposed to them. The site is fenced along its west, south, and eastern sides leaving the north boundary open and accessible to the public. The eastern side of the fence is also breached at the end of Hayden Court. Throughout the site are paths and trails that are well defined indicating frequent use.

The surface of the site has: off-specification products, loose gravels and sands, silty-loams, clay and is sparsely vegetated in the landfill area. All of the landfilled areas appear to lack adequate cover material.

Findings from the 1989, Site Inspection revealed the presence of

arsenic, barium, cadmium, chromium, lead, and zinc on the surface of the site. The results from this inspection can be found in Appendix D. Approximately 4500 people live within a one mile radius of the site but there are no schools or daycare facilities within 200 feet of the site.

4.3 GROUNDWATER PATHWAY

Residents using private wells are the primary users of groundwater in the Wilmington area. These wells range from approximately 15-80 feet in depth, (sand and gravel) and approximately 150-700 feet in depth (Silurian Dolomite). Separating these two aquifers is a confining layer of blue shale and blue clay. The shallow sand and gravel aquifer is the aquifer of concern (AOC). Underlying the glacial-drift is the Ft. Atkinson Limestone and Scales Shales, and the Galena and Platteville Groups.

The closest private well is located approximately 2000 feet southeast of the site on the opposite side of the Kankakee River. Well located east of the Kankakee are located approximately 3/4 of a mile from the site. The 1989 Site Inspection did collect three monitoring well samples and found elevated inorganic levels in two of them. Due to the type of contaminants found during the Site Inspection and the location of the private wells no groundwater samples were collected during this SIP.

4.4 AIR PATHWAY

Residential areas border the eastern side of the site. There are no air related complaints on file with the Illinois EPA, and the landfill operation would not generate significant air emissions. No formal air samples were collected but air monitoring was performed for screening purposes. Both the photo-ionization (PID) and flame-ionization (FID) methods were utilized, with the FID being more responsive to the conditions at the site.

Wind erosion of the surface soils is also minimal except during high winds due to the particle size and soil types of the contaminated soils.

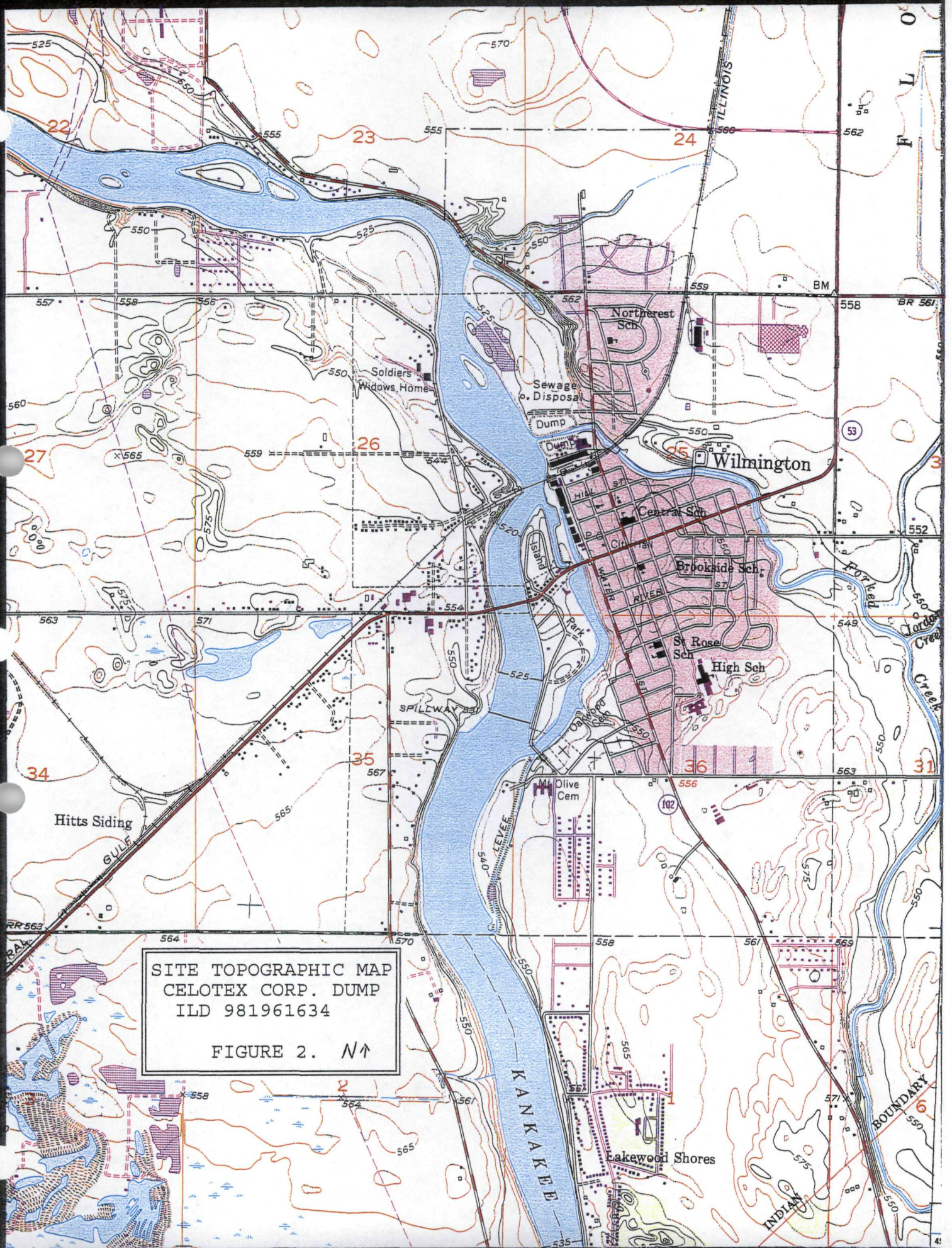
SAMPLE DESCRIPTIONS TABLE 1

<div> <div>Celotex Corp. Dump</div> <div>TABLE 1</div> </div>				
SAMPLE #	DEPTH	APPERANCE	LOCATION	
X201	0-4 inches	sandy, silt	Wilmington Park Wilmington, IL	
X202	0-4 inches	sandy, silt dark brown	100 feet from Kankakee River @ the PPE, near the waste water plant	
X203	0-4 inches	decaying matter silt	up stream of X202, drainage collection area from the site	
X204	0-6 inches	sandy, silt	southern end of forested wetland	
X205	0-6 inches	clay, silt	573 feet from X204, moving down stream in the forested wetland	
X206		duplicate of X205		
X207	0-6 inches	silt	30 foot by 45 foot basin, near a city sewer line	
X208	0-6 inches	sandy, silt light brown	center ponded area has a deep layer of asphalt	
X209	0-5 inches	sandy, silt	200 feet up stream of the confluence of Forked Creek & Kankakee River	
X210		sandy, silt	500 feet up stream of the Kankakee St. bridge on Forked Creek	
Celotex ILD 981961634				



SITE LOCATION MAP
CELOTEX CORP. DUMP
ILD 981961634

FIGURE 1. N ↑



SITE TOPOGRAPHIC MAP
CELOTEX CORP. DUMP
ILD 981961634

FIGURE 2. N↑



FIGURE 3.

CELOTEX CORP. DUMP SITE
ILD 981961634
1988 AIR PHOTO



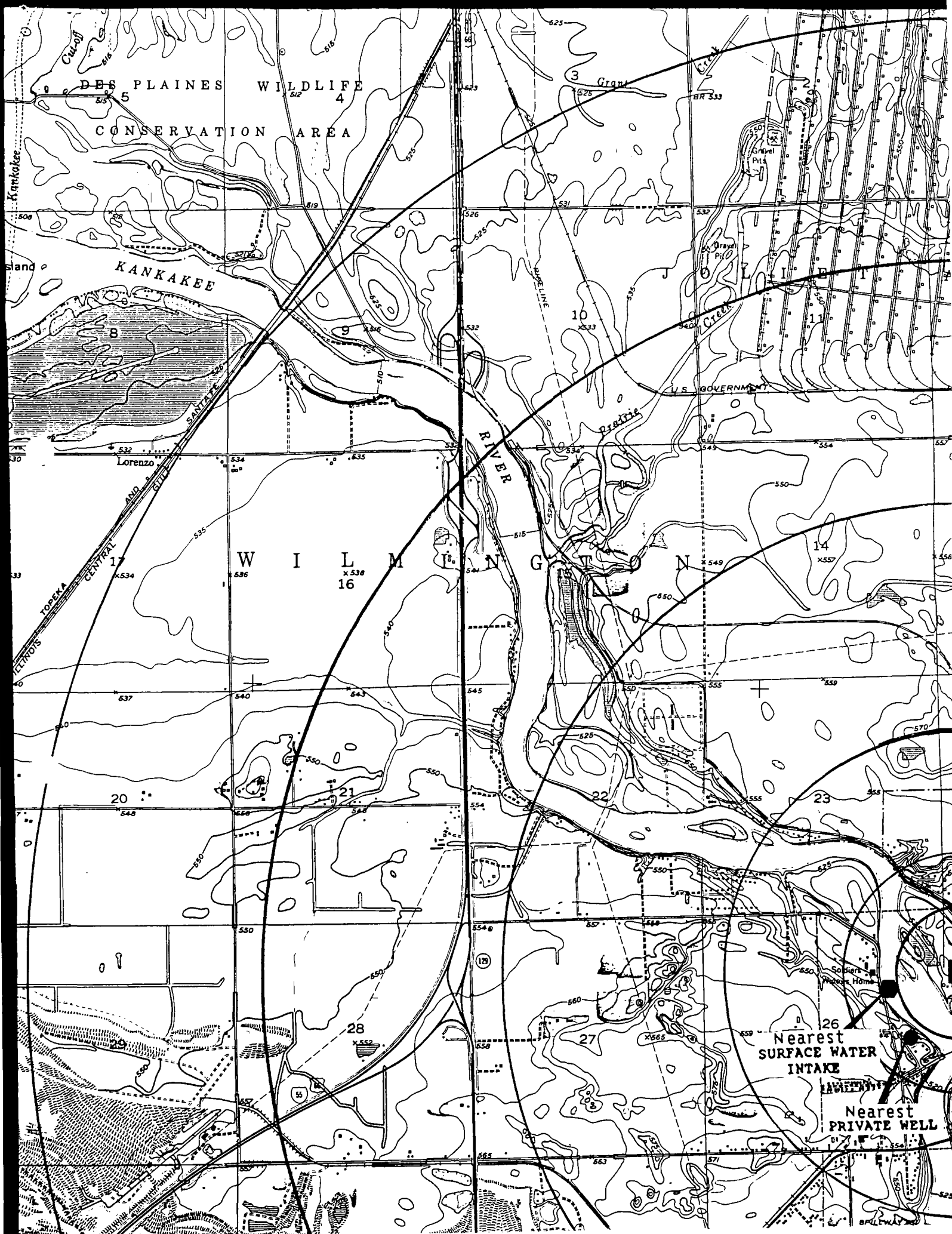
ORIGINAL LANDFILL

X209

FORKED CREEK

PLANT

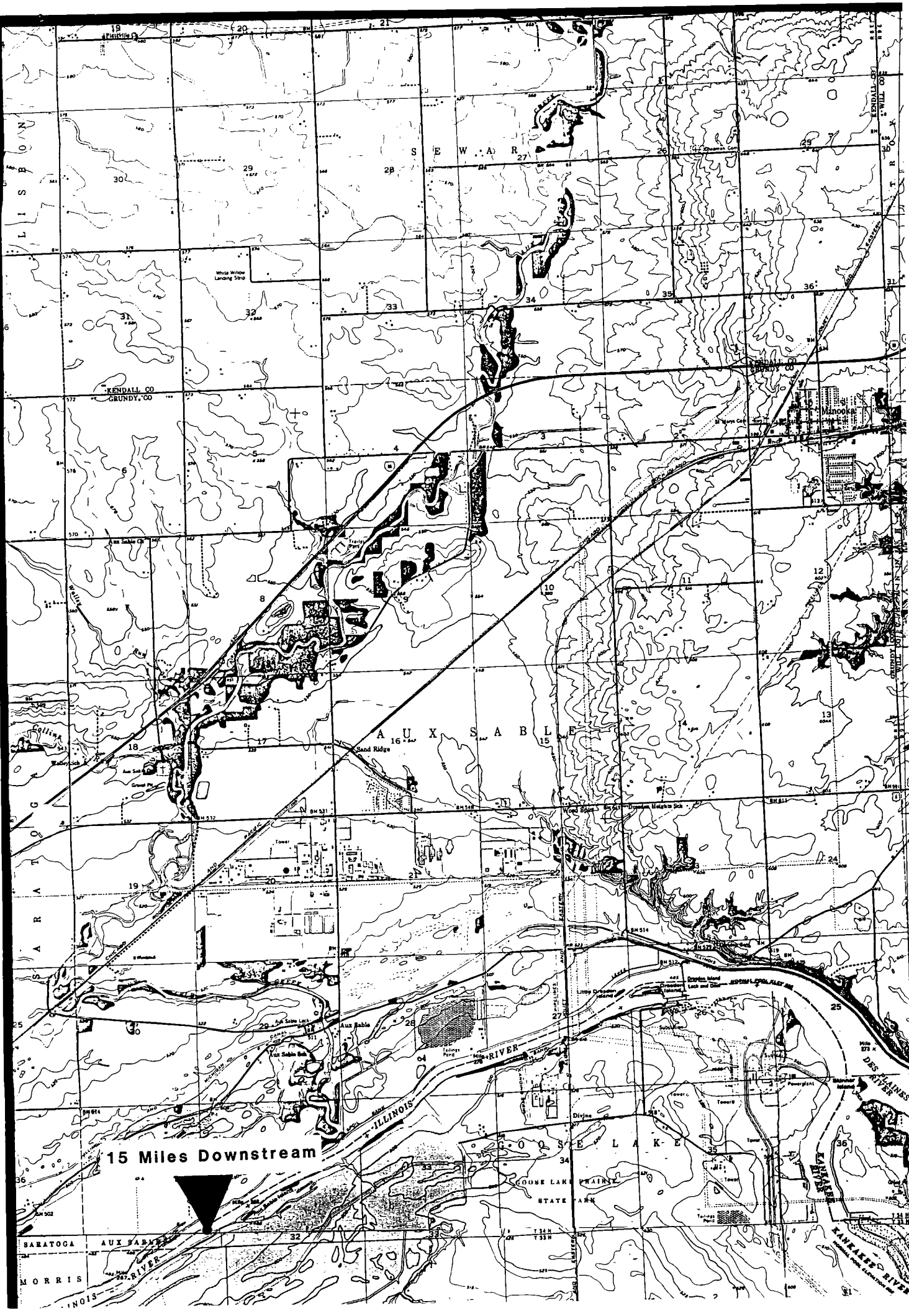
APPENDIX A
4 MILE RADIUS & 15 MILE SURFACE WATER MAP











15 Miles Downstream



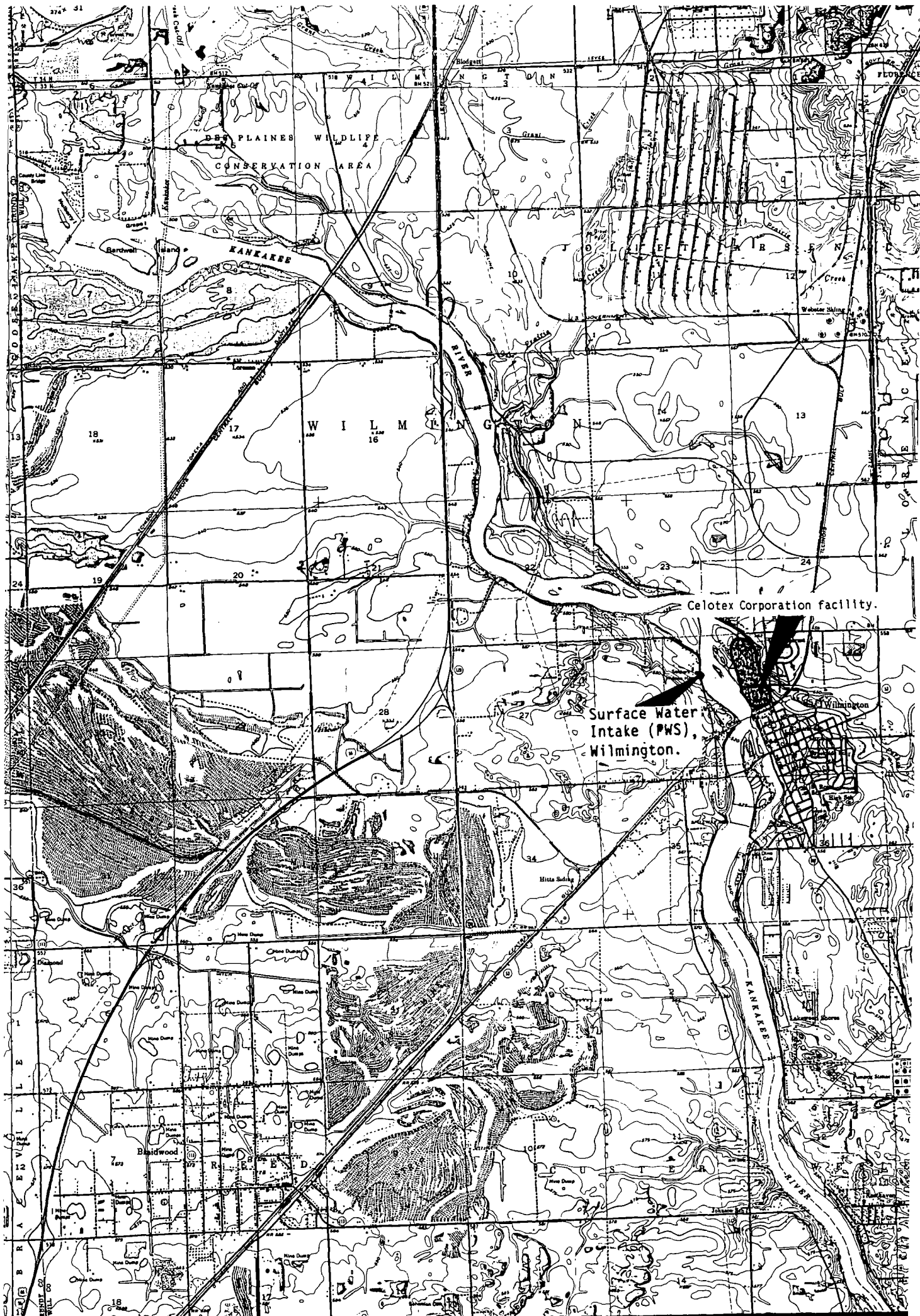
SARATOGA
MORRIS

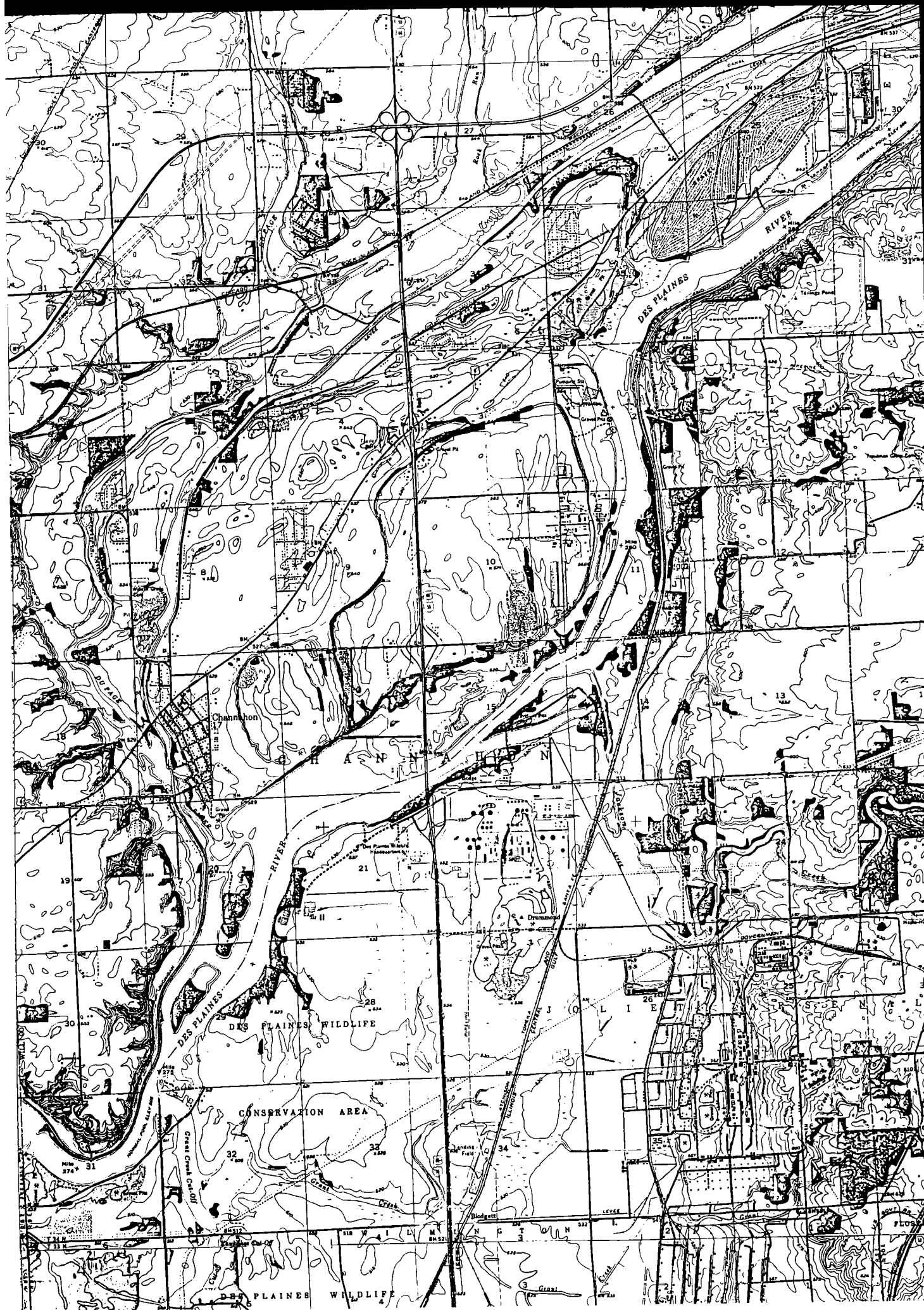
AUX SABLE

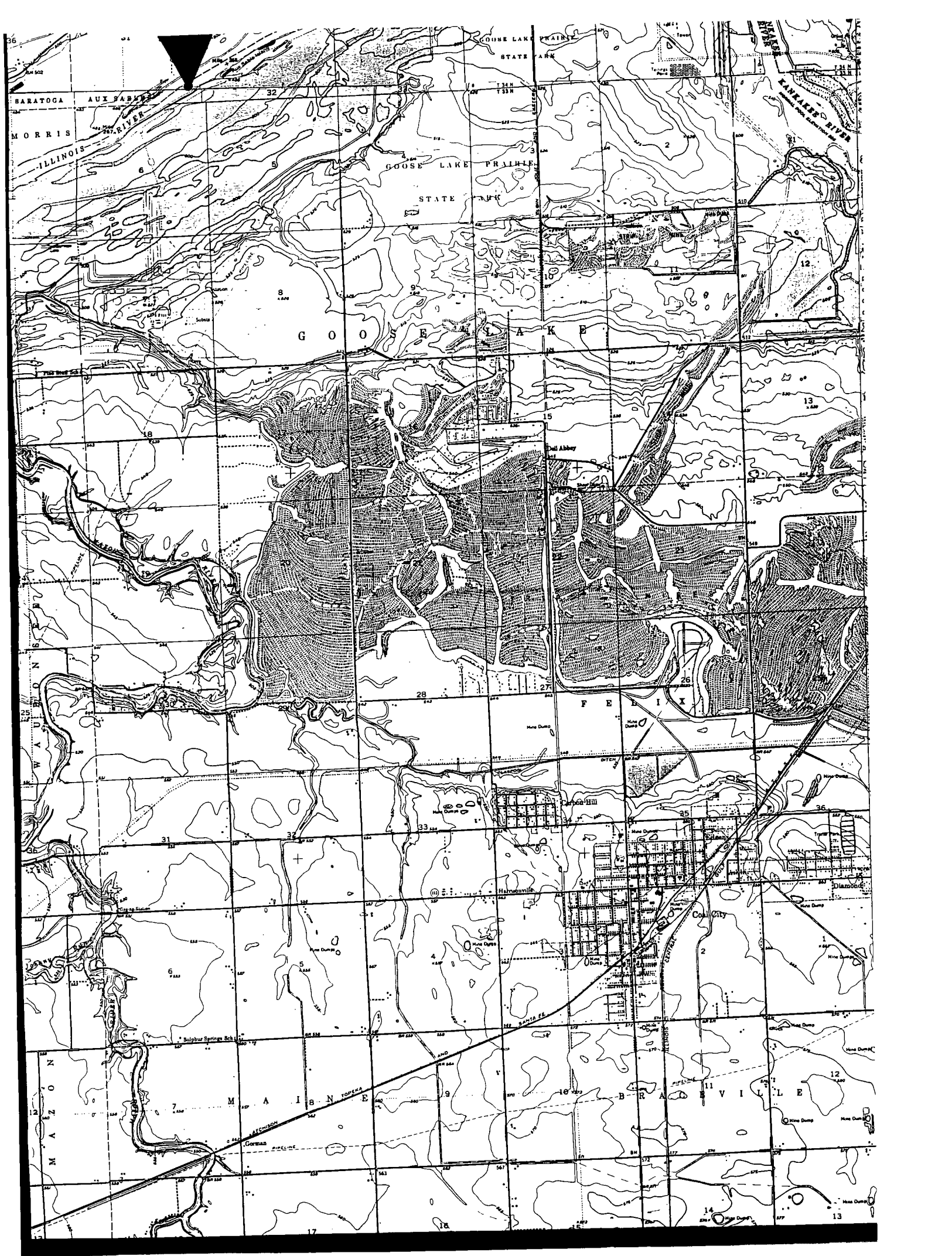
GOOSE LAKE
STATE PARK

MINOOKA

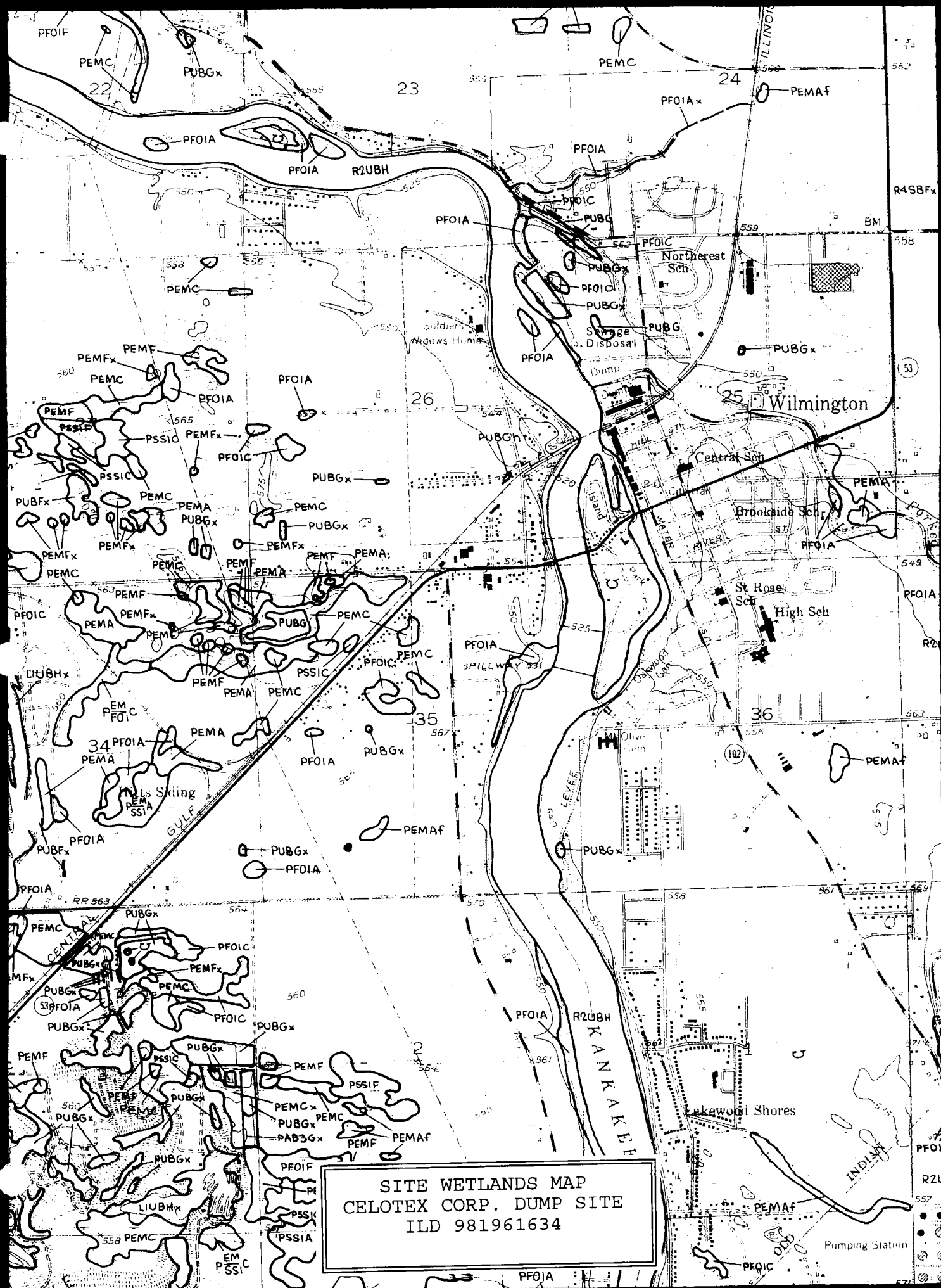
ILLINOIS RIVER







APPENDIX B
AREA WETLAND MAP



APPENDIX C
TARGET COMPOUND LIST & DATA QUALIFIERS

TARGET COMPOUND LIST

Volatile Target Compounds

Chloromethane	1,2-Dichloropropane
Bromomethane	cis-1,3-Dichloropropene
Vinyl Chloride	Trichloroethene
Chloroethane	Dibromochloromethane
Methylene Chloride	1,1,2-Trichloroethane
Acetone	Benzene
Carbon Disulfide	trans-1,3-Dichloropropene
1,1-Dichloroethene	Bromoform
1,1-Dichloroethane	4-Methyl-2-pentanone
1,2-Dichloroethane (total)	2-Hexanone
Chloroform	Tetrachloroethene
1,2-Dichloroethane	1,1,2,2-Tetrachloroethane
2-Butanone	Toluene
1,1,1-Trichloroethane	Chlorobenzene
Carbon Tetrachloride	Ethylbenzene
Vinyl Acetate	Styrene
Bromodichloromethane	Xylenes (total)

Base/Neutral Target Compounds

Hexachloroethane	2,4-Dinitrotoluene
bis(2-Chloroethyl)Ether	Diethylphthalate
Benzyl Alcohol	N-Nitrosodiphenylamine
bis(2-Chloroisopropyl)Ether	Hexachlorobenzene
N-Nitroso-Di-n-Propylamine	Phenanthrene
Nitrobenzene	4-Bromophenyl-phenylether
Hexachlorobutadiene	Anthracene
2-Methylnaphthalene	Di-n-Butylphthalate
1,2,4-Trichlorobenzene	Fluoranthene
Isophorone	Pyrene
Naphthalene	Butylbenzylphthalate
4-Chloroaniline	bis(2-Ethylhexyl)Phthalate
bis(2-Chloroethoxy)Methane	Chrysene
Hexachlorocyclopentadiene	Benzo(a)Anthracene
2-Chloronaphthalene	3,3'-Dichlorobenzidene
2-Nitroaniline	Di-n-Octyl Phthalate
Acenaphthylene	Benzo(b)Fluoranthene
3-Nitroaniline	Benzo(k)Fluoranthene
Acenaphthene	Benzo(a)Pyrene
Dibenzofuran	Indeno(1,2,3-cd)Pyrene
Dimethyl Phthalate	Dibenz(a,h)Anthracene
2,6-Dinitrotoluene	Benzo(g,h,i)Perylene
Fluorene	1,2-Dichlorobenzene
4-Nitroaniline	1,3-Dichlorobenzene
4-Chlorophenyl-phenylether	1,4-Dichlorobenzene

Acid Target Compounds

Benzoic Acid	2,4,6-Trichlorophenol
Phenol	2,4,5-Trichlorophenol
2-Chlorophenol	4-Chloro-3-methylphenol
2-Nitrophenol	2,4-Dinitrophenol
2-Methylphenol	2-Methyl-4,6-dinitrophenol
2,4-Dimethylphenol	Pentachlorophenol
4-Methylphenol	4-Nitrophenol
2,4-Dichlorophenol	

Pesticide/PCB Target Compounds

alpha-BHC	Endrin Ketone
beta-BHC	Endosulfan Sulfate
delta-BHC	Methoxychlor
gamma-BHC (Lindane)	alpha-Chlorodane
Heptachlor	gamma-Chlorodane
Aldrin	Toxaphene
Heptachlor epoxide	Aroclor-1016
Endosulfan I	Aroclor-1221
4,4'-DDE	Aroclor-1232
Dieldrin	Aroclor-1242
Endrin	Aroclor-1248
4,4'-DDD	Aroclor-1254
Endosulfan II	Aroclor-1260
4,4'-DDT	

Inorganic Target Compounds

Aluminum	Manganese
Antimony	Mercury
Arsenic	Nickel
Barium	Potassium
Beryllium	Selenium
Cadmium	Silver
Calcium	Sodium
Chromium	Thallium
Cobalt	Vanadium
Copper	Zinc
Iron	Cyanide
Lead	Sulfide
Magnesium	Sulfate

SPECIAL PESTICIDE LIST

2,4-D

Atrazine

Metolachlor -- Dual

Cyanazine -- Bladex

Fonofos -- Dyfonate

EPTC -- Eptam, Eradicane

Phorate

Metribuzin -- Lexone, Sencor

Trifluralin -- Treflan

Diazinon

Alachlor -- Lasso

DATA QUALIFIERS

QUALIFIER	DEFINITION ORGANICS	DEFINITION INORGANICS
U	Compound was tested for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture. For soil samples subjected to GPC clean-up procedures, the CRQL is also multiplied by two, to account for the fact that only half of the extract is recovered.	Analyte was analyzed for but not detected.
J	Estimated value. Used when estimating a concentration for tentatively identified compounds (TICS) where a 1:1 response is assumed or when the mass spectral data indicate the presence of a compound that meets the identification criteria and the result is less than the sample quantitation limit but greater than zero. Used in data validation when the quality control data indicate that a value may not be accurate.	Estimated value. Used in data validation when the quality control data indicate that a value may not be accurate.
C	This flag applies to pesticide results where the identification is confirmed by GC/MS.	Method qualifier indicates analysis by the Manual Spectrophotometric method.
B	Analyte was found in the associated blank as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.	The reported value is less than the CRDL but greater than the instrument detection limit (IDL).
D	Identifies all compounds identified in an analysis at a secondary dilution factor. If a sample or extract is re-analyzed at a higher dilution factor as in the "E" flag, the "DL" suffix is appended to the sample number on the Form I for the diluted sample, and <u>all</u> concentration values are flagged with the "D" flag.	Not used.
E	Identifies compounds whose concentrations exceed the calibration range for that specific analysis. All extracts containing compounds exceeding the calibration range must be diluted and analyzed again. If the dilution of the extract causes any compounds identified in the first analysis to be below the calibration range in the second analysis, then the results of both analyses must be reported on separate Forms I. The Form I for the diluted sample must have the "DL" suffix appended to the sample number.	The reported value is estimated because of the presence of interference.
A	This flag indicates that a TIC is a suspected aldol concentration product formed by the reaction of the solvents used to process the sample in the laboratory.	Method qualifier indicates analysis by Flame Atomic Absorption (AA).
M	Not used.	Duplicate injection (a QC parameter not met).

N	Not used	Spiked sample (a QC parameter not met).
S	Not used.	The reported value was determined by the Method of Standard Additions (MSA).
W	Not used.	Post digestion spike for Furnace AA analysis (a QC parameter) is out of control limits of 85% to 115% recovery, while sample absorbance is less than 50% of spike absorbance.
*	Not used.	Duplicate analysis (a QC parameter not within control limits).
+	Not used.	Correlation coefficient for MSA (a QC parameter) is less than 0.995.
P	Not used.	Method qualifier indicates analysis by ICP (Inductively Coupled Plasma) Spectroscopy.
CV	Not used.	Method qualifier indicates analysis by Cold Vapor AA.
AV	Not used.	Method qualifier indicates analysis by Automated Cold Vapor AA.
AS	Not used.	Method qualifier indicates analysis by Semi-Automated Cold Spectrophotometry.
T	Not used.	Method qualifier indicates Titrimetric analysis.
NR	The analyte was not required to be analyzed.	The analyte was not required to be analyzed.
R	Rejected data. The QC parameters indicate that the data is not usable for any purpose.	Rejected data. The QC parameters indicate that the data is not usable for any purpose.

APPENDIX D
1989 SITE INSPECTION ANALYTICAL RESULTS &
SAMPLE LOCATION MAP

TABLE 4-1
SUMMARY

SAMPLING POINT	G101 11-20-89	G102 11-20-89	G103 11-20-89	S101 11-20-89	S102 11-20-89	X101 11-20-89	X102B 11-20-89	X103 11-20-89	X104D 11-20-89	X105D 11-20-89	X106 11-20-89	X107 11-20-89	X108 11-20-89
PARAMETER													
VOLATILES													
Methylene Chloride	--	--	--	--	--	--	--	2.00J	2.00J	4.00J	1.00J	--	--
Acetone	15.00R	68.00R	25.00R	--	60.00R	--	--	5.00J	--	44.00J	230.00R	15.00J	--
2-Butanone (MEK)	--	--	--	--	--	--	--	--	--	14.00	56.00	--	--
Toluene	--	--	--	--	--	31.00	400.00J	--	--	--	57.00	--	--
SEMIVOLATILES													
Phenol	--	--	--	--	--	430.00J	--	--	--	--	--	--	--
4-Methylphenol	--	--	--	--	--	1100.00J	840.00J	--	--	--	--	--	--
Benzoic acid	--	--	--	--	--	840.00J	--	--	--	--	--	290.00J	--
Naphthalene	--	--	--	--	--	56.00	340.00BJ	--	--	--	--	--	--
2-Methylnaphthalene	--	--	--	--	--	--	1400R	--	--	--	--	--	--
Acenaphthene	--	--	--	--	--	140.00J	--	--	--	--	--	--	--
Dibenzofuran	--	--	--	--	--	50.00J	--	--	--	--	--	--	--
Diethylphthalate	--	--	0.40J	0.10J	--	--	--	28.00J	--	--	--	--	--
Fluorene	--	--	--	--	--	78.00J	--	--	--	--	--	--	--
Pentachlorophenol	--	--	--	--	--	140.00J	--	--	--	--	--	--	--
Phenanthrene	--	--	--	--	--	790.00BJ	110.00BJ	75.00BJ	8.00BJ	--	--	99.00BJ	90.00BJ
Anthracene	--	--	--	--	--	2000.00BJ	--	12.00BJ	--	--	--	--	--
Di-n-Butylphthalate	--	--	--	--	--	--	480.00BJ	87.00BJ	7.00BJ	--	--	17.00BJ	13.00BJ
Fluoranthene	--	--	--	--	--	9400.00R	--	100.00BJ	16.00BJ	--	--	150.00BJ	150.00BJ
Pyrene	--	--	--	--	--	7400.00R	--	86.00BJ	24.00BJ	--	12000.00J	210.00BJ	170.00BJ
Butylbenzylphthalate	--	--	--	--	--	--	830J	--	--	--	--	--	--
Benzo(a)anthracene	--	--	--	--	--	2600.00BJ	--	--	--	--	--	390.00BJ	140.00BJ
Chrysene	--	--	--	--	--	2900.00R	--	--	--	--	--	--	110.00BJ
bis(2-Ethylhexyl)phthalate	1.00J	0.20R	0.80J	--	--	3800.00R	5500R	--	--	55.00BJ	--	--	110.00BJ
Benzo(b)fluoranthene	--	--	--	--	--	930.00J	--	--	--	--	--	--	--
Benzo(a)pyrene	--	--	--	--	--	670.00J	--	--	--	--	--	--	--
PESTICIDES													
Heptachlor epoxide	--	--	--	--	--	--	--	--	--	--	--	3.50J	--
Dieldrin	--	--	--	--	--	--	4.00J	1.00J	--	--	--	18.00J	--
4,4'-DDE	--	--	--	--	--	--	--	--	--	--	--	--	1.00J
4,4'-DDT	--	--	--	--	--	--	--	--	--	--	--	22.00J	--
gamma-Chlorodane	--	--	--	--	--	--	--	--	--	--	--	7.00J	--
Aroclor-1260	--	--	--	--	--	550.00J	--	--	--	--	--	--	--
INORGANICS													
Aluminum	--	--	80.00R	175.00	162.00	8000.00	4200.00	6300.00	16600.00	5200.00	1470.00	8400.00	3200.00
Antimony	--	--	--	--	--	4.60	1.2	--	0.60R	--	--	0.60R	--
Arsenic	3.00R	--	51.00	--	--	1.70R	0.9R	2.20	8.60	3.50	1.8	11.00	3.00
Barium	260.00	47.00R	690.00	43.00R	43.00R	200.00	74.00	66.00	170.00	61.00	22.00R	98.00	74.00
Beryllium	--	--	--	--	--	--	--	0.50R	1.40	0.50	0.30R	0.80R	0.41R
Cadmium	--	--	2.00R	--	15.00R	--	--	3.60	9.30	3.00	0.80R	7.60	1.70
Calcium	155000.00	115000.00R	110000.00R	99000.00	98000.00	20700.00	4600.00	11200.00	34900.00	3640.00	3900.00	18700.00	4100.00
Chromium	8.00R	5.60R	8.00R	6.00R	5.80R	33.00	16.00	16.00	28.00	8.90	3.60	18.00	4.70
Cobalt	2.40R	1.80R	10.00	2.80	3.20R	2.10R	--	--	14.00	4.90R	0.90R	7.90R	3.00R
Copper	--	2.00R	--	2.40R	2.40R	120.00	45.00	14.00	51.00	10.00R	7.40	32.00	7.70
Iron	13500.00	336.00R	14000.00R	317.00	313.00	4900.00	3000.00	12600.00	32600.00	13500.00	3100.00	24700.00	6700.00
Lead	1.00R	--	--	--	--	150.00	56.00	32.00	65.00	13.00	20.00	85.00	45.00
Magnesium	68000.00	45700.00	67000.00R	41000.00	41000.00	2200.00R	1160.00R	6900.00R	12800.00	13000.00	1700.00	6700.00	1500.00
Manganese	187.00	4.60R	220.00R	15.00R	15.00R	500.00	150.00	370.00	1100.00	560.00	44.00	600.00	370.00
Mercury	--	--	--	--	--	0.16	0.17	--	0.15	0.11	--	0.14	.02R
Nickel	--	--	27.00R	--	--	7.10R	2.9R	11.00	29.00	10.00	12.00	34.00	5.80R
Potassium	29000.00	380.00R	4300.00R	1300.00R	1300.00R	--	--	680.00R	1500.00	320.00R	120.00R	1100.00R	550.00R
Silver	--	--	--	--	2.30	--	--	--	--	--	--	--	--
Sodium	19000.00	128000.00R	89000.00	11000.00	11000.00	390.00	1000R	230.00R	160.00	150.00R	--	--	--
Thallium	--	--	--	--	--	--	--	--	0.30	--	--	--	--
Vanadium	--	--	--	--	--	11.00R	7.7R	16.00	36.00	9.50R	19.00	22.00	8.70R
Zinc	12.00R	--	--	--	--	570.00	140.00	71.00	250.00	51.00	58.00	250.00	58.00
Cyanide	--	--	--	--	--	43.00	10.6	--	--	--	--	--	--
Sulfate	219000.00	66000.00R	36000.00R	85000.00	88000.00	--	--	--	--	--	--	--	--

-- indicates compound was analyzed but not detected.

